

Insecticidal Poisoning in Human Visceral Organs

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Abstract

Background: The use of pesticides and insecticides has brought Green Revolution. Yet, the pollution of soil, water and air caused by these chemicals make so many disorders in human body. They get accumulated in certain tissues of human visceral organs and may lead to slow poisoning. Poverty or emotional unbalance stimulates suicidal tendency in people, who misuse these poisonous chemicals. In a quest to find some method to analyze the presence of these toxins in body tissues the present work was undertaken. A poison can gain entrance into the human system by inhalation, ingestion, injection, introduction into body cavities or by application over body surfaces. The poison undergoes metabolic changes and may be detoxified. Under these conditions, the amount of poison remaining in the body becomes too small and sometimes it is available in traces.

Methodology: The tissues and organs, in which the poison is suspected to be present, should be preserved for chemical analysis. The steps to identify a poison in biological tissues involve separation of the poison from the tissues, its isolation into a characteristic group, detection and identification by Thin Layer Chromatography. Some adsorbents like silica gel and alumina are supported as thin layers on glass plates called chromate plates. In this technique, we have a wider choice of the media. So, we can separate the compounds by means of partition, adsorption and ion exchange. Cases of Organo Phosphorus poisoning are taken up for the study. The methodology for analyzing the poison includes visual study, odor test, Reinsch test to detect the presence of metals as poisons, test for rodenticide, tests for cyanide, nitrite and nitrate.

Results and Discussion: The analysis for the organo phosphorus insecticide includes solvent extraction, filtration, concentration and analytical detection by Thin Layer Chromatography. Based on the experiments conducted, it has been found that the cases of organo phosphorus poisoning are increasing day by day.

Conclusion: Many people consider that taking life off either a human being or an animal by blood-shed is a greater sin. This belief has led to the use of poisonous insecticides which has led to complete putrefaction and sepsis of internal organs of the victim's bodies.

Keywords: Human visceral organs; Poisonous chemicals; Metabolic changes

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Introduction

The dire necessity of food for each human being for his existence forces the mankind to increase the quantum of food production. Only after the onset of Green Revolution which popularized the use of chemical fertilizers, pesticides etc., the level of production

of food crops began to soar to leave a considerable amount of surplus behind.

Fertilizers, insecticides and pesticides have adverse effects on man through the process of toxication of crop produce, the essential nutrients are replaced by toxic materials which get into man and cause physiological problems. More serious than this is the fact

that most of the victims who have committed suicide tempted to have consumed some powerful chemicals being used in farms. Insecticides especially the organo phosphorus compounds come handy to them. The high toxicity of those compounds immediately affects the visceral organs of the body and leads to death. The price the victim must pay for his death is the intolerable nerve splitting pain during the deterioration of internal organs under the chemical action of the toxins [1]. Thus, a poison is a substance which when administered or taken in small quantity will produce ill-health or death by its constitutional, local and cumulative effects [2]. Insecticides represent one group of pesticides that are used in large quantities and have a history of causing toxic effect in humans. They are classified into three types based on their structural difference, Organo phosphorus insecticide, Organo chlorinated insecticide, Organo carbamate insecticide [3]. The toxicological analysis of biological tissues involves separation of the poison from the biological tissue and analytical detection by chromatographic technique.

Materials and Methods

Organo phosphorus is taken as the scope of study which is a nerve poison affecting both the central and autonomic nervous system. They have two distinct effects:

1. A muscarinic-like effect that potentiates postganglionic parasympathetic activity and affects pupil, bronchus, salivary glands, urinary bladder etc.
2. Central nervous system stimulation followed by depression causing headache, giddiness restlessness, ataxia, coma and ultimate death [4].

Reagents used

Solvents used in the experiment: Acetone, chloroform and hexane.

Chemicals used: Alumina, Ammonium Molybdate, Ammonium Sulphomate, Charcoal, Copper foil, Dilute HCl, Dilute HNO_3 , Dilute H_2SO_4 , Metabisulphate, Bromine vapor, Zinc dust, Ferrous hydroxide filter paper etc.

Developing agent: Hexane: Acetone = 4: 1.

Spray reagent: Congo red dissolved in 20 ml of 50% ethanol.

Chemical analysis: The toxicological analysis of biological tissues involves:

1. Separation of the poison from the biological tissue.
2. Analytical detection by thin layer chromatography.

Diagnosis of poisoning: It depends on the following:

1. History of the case as provided by the police or the relatives. The history should be taken in the line as in the case of living victims. In addition to these points, the history should also contain two more vital points.
2. For how long the victim survived after the start of the initial signs and symptoms of poisoning [5].
3. Whether he was given any treatment. If so, the details of the treatment should be given.

4. Post-mortem examination of the body [6].

5. In the case of organo phosphorus poisoning.

External findings: Blood tinged froth from mouth and nose, ulceration on lips and near the angles of mouth.

Internal findings: Chalky appearance and consistency of teeth, the small intestine may show the presence of poisonous remains and detectable smell is noted.

Experimental Procedure

Preservation of viscera and other materials for laboratory examination

Appropriate material for the detection of poisons [7]: The portion of the viscera of the deceased is preserved in bottles.

Bottle 1-Stomach with its full contents,

Bottle 2-Small intestine and its contents,

Bottle 3-Part of liver,

Bottle 4-Blood,

Bottle 5-Sample of preservative.

Preservation by solid common salt

The tissues are taken into the container and to it sufficient solid common salt is added, and the tissues are immersed well within the salt and excess of solid salt should remain at the bottom of the container and over the tissues. A sample of the preservative should be checked to exclude the presence of any poison in it [8].

Method of analysis

1. **Visual study:** The first step to identify a poison in human visceral organs is to observe its color and appearance.

2. **Odor:** The next step is to observe the odor of the visceral organ. Most organo phosphorus insecticides have kerosene smell [9].

Reinsch test

This test is used to exclude the presence of metals as poisons [10].

Test for rodenticide

When the given viscera are treated with concentrated hydrochloric acid, phosphine is liberated if rodenticide poison is consumed [11].

Detection of insecticide in human visceral organs

The insecticides under study are the organo phosphorus compounds which are most commonly used for the farms. The viscera are then tested chemically for cyanide, nitrite and nitrate [12,13].

Method of analysis

The poison is analyzed by solvent extraction, filtration and concentration methods and then it is analytically detected by

thin layer chromatography [13,14]. The location of the poisonous insecticide is identified by developing the chromatogram. Colored compounds are identified by visual inspection. To identify the colorless compound, the plate is sprayed with specific spraying agent. Here the developed TLC plate is placed for 30 seconds in a chamber containing bromine vapors and then sprayed with Congo red. By comparing the R_f values of the case samples with the controls, the individual poisonous insecticide is identified [15]. R_f value is given by the ratio of the distance travelled by the solute to the distance travelled by the solvent.

Results

Based on experiments conducted, it has been found that the cases of organo phosphorus poisoning are increasing day by day. This is because many people consider that taking life off either a human being or an animal by blood-shed is greater sin. This belief has led to the use of poisonous insecticides for this purpose and it is a sad fact that the insecticides were consumed which has led to complete putrefaction [16] and sepsis of internal organs of the victim's bodies. Based on our study, the incidences of poisoning are mainly suicidal, homicidal, exhibitional for creating sympathy, stupefying, aphrodisiacal to arouse human sexual desire and known as love philter, love potion etc., abortifacient to induce abortion and accidental [17,18].

The organo phosphorus insecticides which are commonly used in the farms come handy to them [19]. In our study, it is observed that accidental ingestion beyond the age of five is unusual and typically reflects the consumption of a substance from a mislabeled container [20]. Sporadic reports of children poisoned by their parents do occur. Exposure to substances beyond the age of nine years reflects the intra family stress or suicidal intent. Poisoning mortality is lowest between the ages of five and fourteen years [21]. The incidence of suicide in children between five and twelve years of age reportedly is between 0.2 and 0.4 per hundred thousand [22].

References

1. Tewari SN (1985) Text book of toxicology. Pergamon Press, London, UK. pp: 1-30.
2. Singhal SK (1983) Toxicology at a glance. Acad Press London, UK. 1: 577-595.
3. Curtis I (1986) Casarett and Doull's Toxicology. Acad Press, (3rd and 5th edn), London, UK.
4. Stahl E (2000) Thin layer chromatography. (2nd edn), Springer-Verlag, Berlin. pp: 52-105.
5. Curry AS (1976) Poison detection in human organs. Acad Press, London, UK. 1: 2.
6. Reddy KSN (2001) The essentials of forensic medicine and toxicology. (20th edn) Medical Publishers, New Delhi, India.
7. Nandy A (2001) Principles of forensic medicine. Medical Publishers, New Delhi, India. pp: 438-454.
8. Rao N (1997) Textbook of forensic medicine and toxicology. Medical Publishers, New Delhi, India.
9. Curry AS (1969) Poison detection in human organs. Acad Press, (4th edn) London, UK. pp: 70-78.

Discussion and Conclusion

The tissues and organs in which the insecticidal poisoning is suspected to be present is cut into small pieces and soaked in chloroform for one day [23]. The poisonous substance is thus extracted from the tissues into the organic layer. It is then transferred into a china dish after purification [24]. The contents are concentrated in a water bath maintained at 100°C. When the volume reduces to 5ml, the dish is taken out. The concentrated poison is then spotted on a TLC plate which is previously prepared and activated. Suitable controls are spotted on the side of the case sample [25]. The plate is then kept in hexane: acetone (4:1) solvent system. After the solvent has raised a certain distance, the plate is taken out. The solvent front is marked and dried. The plate is placed for 30 seconds in a chamber containing bromine vapors and then sprayed with Congo red. Out of all the cases under our study, about thirty five percent constituted deaths are due to organo phosphorus insecticidal poisoning. It is observed that accidental ingestion beyond the age of five is unusual and typically reflects the consumption of a substance from a mislabeled container [26]. Sporadic reports of children poisoned by their parents do occur [27]. Exposure to substances beyond the age of nine years reflects the intra family stress or suicidal intent [28]. Poisoning mortality is lowest between the ages of five and fourteen years [29]. Most exposures in the elderly over fifty years result from accident (83%), 14.8% with suicidal intent and 1.7% due to drug abuse, which are more common in young adults [30].

Conflicts of Interest

Authors state no conflicts of interest and are responsible for the content of the article. There is no financial grant obtained for conducting this study.

10. Durairaj A (2000) Clinical management of poisoning and medical toxicology. Acad Press, London, UK. 2: 88-89.
11. Driesbach R (1985) Handbook of poisoning, preservation, diagnosis and treatment. Acad Press, London, UK. 5: 1.
12. Bamfoed F (2001) Poisons-Their detection and identification. Acad Press, London, UK. 1-2: 519-535.
13. Solenkhe K, Gupta PK (1985) Modern toxicology. Acad Press, Newyork, USA. 1-3: 5.
14. Chadha PV (1989) Handbook of forensic medicine and toxicology. Pergamon Press London, UK. 1: 1.
15. Parikh CK (1987) Textbook of medical jurisprudence and toxicology. Jaypee Publishers, New Delhi, India.
16. Stewart CP (1987) Toxicology: Mechanisms and analytical methods. Acad Press, London, UK. 1: 1-2
17. Stolman P (1987) Toxicology: Mechanisms and analytical methods. Acad Press, London, UK. 1: 1-2.
18. Knight RB (1989) Medical jurisprudence and toxicology. (6th edn) Acad Press, London, UK.

- 19 Singhal ML (1989) Medical jurisprudence and toxicology. (5th edn) Acad Press, London, UK.
- 20 Sahai VB (1990) Textbook of medical jurisprudence and toxicology. Jaypee Publishers, New Delhi, India.
- 21 Rengarajan K, Gopalan R, Subramanian PS (2013) Elements of analytical chemistry. (2nd revised edn) Sultan Chand and Sons, New Delhi, India.
- 22 Merck & Co. (1968) The Merck Index. (12th edn), Acad Press, London, UK.
- 23 Narayanaswamy M (2001) Law relating to insecticides in India. (2nd edn), Acad Press, London, UK. 2: 1.
- 24 Chadha RV (1985) Handbook of forensic medicine and toxicology. Acad Press, London, UK.
- 25 Gupta LC (1983) Viva in forensic medicine and toxicology. Acad Press, London, UK.
- 26 Mant AK (1986) Taylor's principles and practice of medical jurisprudence. Acad Press, London, 3: 1.
- 27 Misri S (1987) Manual of forensic medicine. Pergamon Press, London, UK. 2: 1.
- 28 Dimaio VJ (1983) Handbook of forensic toxicology. Acad Press, London, UK. 3: 1.
- 29 Suzanna E (1988) Handbook of forensic toxicology. Acad Press, London, UK.
- 30 DiMaio VJM, Dana SE (1995) Handbook of forensic medicine and toxicology. Acad Press, London, UK.